CHAPTER 9

INFECTION CONTROL

Infection control involves taking steps to prevent the spread of infectious agents. Your command will develop standard infection control policies and written protocols following BUMEDINST 6600.10. COs and OICs must appoint in writing an infection control officer (ICO) to assist in implementing the infection control program. Material in this chapter and in chapter 10 are taken from BUMEDINST 6600.10, *Dental Infection Control Program.* Some of the information may be different from what your command policies and procedures are for infection control. COs and OICs may adapt the policies and procedures from BUMEDINST 6600.10 to meet their local conditions and criteria. **Compliance with BUMEDINST 6600.10 is mandatory.** If your command has significant variations from BUMEDINST 6600.10, the ICO must document in the infection control manual the reasons for those changes.

All dental personnel must be aware of sources and methods of transmission of pathogenic micro-organisms and infectious diseases. The emergence of the human immunodeficiency virus (HIV) epidemic, along with recent reports about health care workers who have acquired an HIV infection through occupational exposure, has generated much fear and worry within all the health professions, including dentistry. Healthcare personnel are caught in a conflict between concern for their patient's needs on the one hand and fear of acquiring HIV infection on the other.

Adding to this dilemma is the problem of the hepatitis virus (HBV) infection, a major infectious occupational health hazard in all the healthcare professions. Each year, several thousand healthcare workers become infected with the HBV. The Center for Disease Control (CDC) estimates that HBV infection in healthcare personnel actually results in some 600 hospitalizations and 200 deaths annually. These concerns have led to a renewed interest in the problem of infection control in the dental health care environment.

CLASSIFICATIONS OF MICRO-ORGANISMS

Microbiology is the study of microscopic life forms referred to as micro-organisms. They are so small that they can only be seen with the aid of a microscope. Micro-organisms are always present in our environment; most live in warm, dark surroundings where adequate food supply exists. The oral cavity is one such area where enormous numbers of micro-organisms commonly exist and multiply. A *pathogen* is an organism capable of causing disease. Disease producing organisms are said to be pathogenic. Other micro-organisms that are not considered pathogenic can produce infections under favorable conditions. Micro-organisms are classified as bacteria, bacterial spores, viruses, protozoa, and fungi.

BACTERIA

Bacteria are one-celled plants that lack chlorophyll (the chemical that provides the green coloring to plants). A single drop of water may contain as many as two billion medium-sized bacteria. Some diseases caused by bacteria are dental decay, periodontal disease, and tuberculosis.

The three main types and shapes of bacteria are as follows:

1. **Cocci**—spherical and shaped like small beads
2. **Bacilli**—rod-shaped
3. **Spirochetes**—spiral-shaped

Gram Positive and Gram Negative Bacteria

Certain antibiotics treat different types of bacterial infections. A liquid dye called gram stain is used on the bacteria to determine if they are gram negative or gram positive.

Bacteria that are stained by the dye and turn a dark purple color under microscopic study are called gram-positive bacteria. If no color exists after staining and viewing, the bacteria is called gram negative. A dental officer may submit a bacterial culture to the medical laboratory to determine if it is gram positive or negative before prescribing an antibiotic to treat an infection.

Bacterial Spores

Bacteria are very resistant to all environments. A protective coating on the surface helps the bacteria evade the defense mechanisms of the body and generally makes it more durable.

Not all bacteria will take on the form of a spore's shell-like coating to withstand unfavorable conditions. Bacteria in a spore state remain alive but passive, and they are resistant to the effects of heat, drying, and most bactericidal chemicals. They will remain capable of becoming virulent (strongly pathogenic) again under favorable conditions. However, under unfavorable conditions, they will either die or remain dormant in a spore state until another opportunity for growth presents itself.

Viruses

Viruses are micro-organisms that are much smaller than bacteria. Viruses vary in size, from being the size of a single protein molecule to the size of a more complicated bacterial cell. They can be so small that they can be seen only through an electron microscope.

Viruses cannot live long or reproduce outside of a living body (host). They must be able to enter and live in specific cells. For descriptive purposes, they are customarily divided into three subgroups, based on host specificity:

1. Bacterial viruses
2. Animal viruses (including those that attack humans)
3. Plant viruses

Some of the most common diseases caused by viruses are colds, smallpox, measles, rubella, herpes simplex, AIDS, infectious hepatitis, and serum hepatitis. Viruses are usually not affected by therapeutic treatment with antibiotics. Generally, therapeutic treatment is not used to combat a viral infection, but used to treat a secondary bacterial infection that may develop.

Most viruses are susceptible to immersion in boiling water for at least 20 minutes. There are two major exceptions to this rule, infectious hepatitis and serum hepatitis. Because of these exceptions to heat resistance, autoclaving for a minimum of 20 minutes at 270°F, or dry heat sterilization for 90 minutes at 320°F are the only safe procedures for control of these two viruses.

PROTOZOA

Protozoa are single-celled animals that do not have a rigid cell wall. Some protozoa cause parasitic diseases but not all are pathogens. Most species are harmless, living on dead organic matter or bacteria. Protozoa that are pathogenic survive freely in nature and must be spread by a carrier.

Most protozoa pass through a life-cycle, meaning that they have definite stages of development. These stages vary for each species and are usually very complicated. Malaria is an example of a disease that is caused by protozoa.

FUNGI

Fungi, like bacteria, are plants that lack chlorophyll. They are free-living organisms that are smaller than protozoa. Mold and yeast forms of fungi have firm cell walls and resemble plants more than animals.

Molds usually form cells in long chains or threads that grow into tangled masses. Some threads of the mass bear clusters of seedlike spores that, when dry, are easily blown into the air like dust. Each microscopic seed is capable of growing new mold upon settling in a suitable place. Mold spores are easily destroyed by heat. The most common infections in humans because of mold are athlete's foot and ringworm. The mold penicillium is very common in nature and contributes to the spoilage of food. The drug penicillium is derived from this mold.

INFECTION CONTROL TERMS AND DEFINITIONS

The following terms and their definitions will help you understand the material that is in this chapter and in chapter 10, "Sterilization and Disinfection," Volume 1:

Asepsis—The prevention of contact with micro-organisms.

Automated washer processor—Washer, sterilizer, dishwasher, or other mechanical washing device.

Barrier technique—The use of rubber, plastic, foil, or other fluid resistant materials to cover surfaces and protect them from contamination.

Bioburden—The number of micro-organisms contaminating an object. Also known as bioload or microbial load.

Biological control—An unprocessed biological monitor from the same lot as the test monitor. When cultured, serves as a control by verifying the viability of the unexposed organisms.

Biological monitor—A bacterial endospore test designed to assess whether sterilization has actually occurred. Also known as biological indicator or biological spore test.

Bloodborne pathogens—Pathogenic micro-organisms that are present in human blood and capable of causing disease in humans.

Bowie-Dick Type Test—A diagnostic test of a prevacuum sterilizer's ability to remove air from the chamber and detect air leaks. This is not a sterility assurance test.

Chemical disinfection—The destruction or inhibition of most viruses and bacteria while in their active growth phase. The process does not necessarily kill all spores nor can it be verified by a monitor.

Chemical indicator—Chemical dyes used to determine whether the conditions required for sterilization are met. Also known as internal or external indicators, dosage indicator, or process indicator.

Contaminated—The presence or reasonably expected presence of blood or other potentially infectious material on an item or surface.

Contaminated laundry—Laundry that has been visibly soiled with blood or other potentially infectious materials.

Culture—The reproduction and growth of micro-organisms or living tissue cells in or on a nutrient medium.

Dental item classification—Dental items are classified as critical, semicritical, or noncritical based on the pathways through which cross-contamination may occur and the location and technique of instrument use.

Critical items—Instruments and materials that penetrate the skin, mucous membranes, or bone. These items must be sterile before use. Examples include surgical instruments, periodontal knives, and suture needles.

Semicritical items—Instruments, equipment, or materials that frequently contact mucous membranes, but cannot be sterilized because of their design or inability to withstand heat. At a minimum, these items require high-level disinfection. Examples include some radiographic positioning devices and plastic impression trays.

Noncritical items—Instruments, equipment, or materials that do not normally penetrate or contact mucous membranes but which are exposed to splatters, sprays, or splashing of blood, or are touched by contaminated hands. These items require intermediate-level disinfection. Examples include the dental unit and chair.

Engineering controls—Equipment or methods that isolate or remove bloodborne pathogens from the workplace. A few examples include: use of the rubber dam; use of the high-volume evacuator during production of splash, splatter, and aerosols; adequate ventilation and air circulation; puncture-proof sharps containers; closing the lid of ultrasonic cleaners during operation; and use of cassettes to minimize handling of instruments during transport and sterilizing process.

Exposure incident—A specific eye, mouth, or other mucous membrane, nonintact skin, or percutaneous exposure to blood or other potentially infectious materials.

Exposure time—The total continuous elapsed time during which the sterilizer is operating at preselected sterilizing parameters, such as temperature and pressure.

Infectious micro-organisms—Organisms capable of producing disease in a host.

Infectious waste—Termed "regulated waste" and defined as liquid or semiliquid blood or other potentially infectious materials (OPIM); contaminated items that would release blood or OPIM in a liquid or semiliquid state if compressed; items caked with dried blood or OPIM that are capable of releasing those materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or OPIM. Also included as OPIM are saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

Invasive procedure—A surgical entry into the tissues, cavities, organs, or repair of major traumatic injuries. This includes the manipulation, cutting, or removal of any oral or perioral tissue during which bleeding occurs, or the potential for bleeding exists. Routine restorative or related dental procedures are not invasive procedures.

Micro-organisms—Bacteria, fungi, viruses, and bacterial spores.

Nosocomial infection—An infection originating in the environment of a hospital or freestanding dental treatment facility (DTF).

Personal protective attire—Specialized barrier attire worn by an employee to protect against a hazard.

Occupational exposure—Reasonably anticipated skin, eye, mucous membrane, or parenteral exposure to blood or other potentially infectious materials that may result from performance of your duties, despite the appropriate use of protective attire or equipment.

Saturated steam sterilization—A process that uses steam heat under pressure for sufficient length of time to kill all forms of micro-organisms.

Sanitary sewer system—A sewer system connected to a sewage treatment plant.

Spray-wipe-spray—An acceptable method of cleaning and disinfecting. Presently there is no agent on the market with the Environmental Protection Agency (EPA) registration that cleans and disinfects in one step. Therefore, the importance of cleaning as a separate step from disinfection and sterilization cannot be overemphasized.

Sterile, sterility—Free from all living micro-organisms.

Sterilization—Process that destroys all types and forms of micro-organisms.

Sterilization area—The area of a health care facility designed for housing sterilization equipment and conducting sterilization procedures.

Sterilizer (gravity displacement type)—A type of sterilizer in which incoming steam displaces via gravity, the residual air through a port or drain usually in or near the bottom of the sterilizer chamber. Common exposure techniques: 30 minutes at 121-123°C (250-274°F) and 15 to 17 pounds per square inch (psi); or 15 minutes at 132-135°C (270-274°F) and 30 to 32 psi. Always follow manufacturer's recommended settings.

Sterilizer (prevacuum type)—A type of sterilizer that relies on one or more pressure and vacuum evolutions at beginning or end of the cycle. This method of operation results in shorter cycle times because of the rapid removal of air from the chamber and the load by a vacuum system. Operating temperatures are 132-135°C.

Unit dose—The quantity of materials or supplies required to treat a single patient.

Universal precautions—A protocol for infection control that treats all human blood and body fluids as if known to be infectious for HIV, HBV, and other bloodborne pathogens.

Work practice controls—Controls that reduce the likelihood of exposure by altering the way one performs a task such as having patients brush their teeth or using antiseptic mouthwash before beginning a procedure; using the rubber dam whenever possible, disinfecting the isolated teeth, and using a disinfectant mouthwash before and after applying the dam; heavy duty, puncture-resistant utility gloves (fig. 9-1) are used when handling instruments, and while cleaning and disinfecting instruments during the sterilization process; using an accepted and safe technique for recapping needles; and disposing of sharps before beginning cleanup procedures at the conclusion of treatment.

UNIVERSAL PRECAUTIONS

Identifying potentially infectious patients by medical history, physical examination, or readily available laboratory tests is not always possible. A period of up to several weeks often exists between the time a person becomes infected with a virus and the time when a laboratory test can detect the antigens or antibodies that form. In an HIV-infected individual, this period could be 6 months or more. Consequently, even if a patient tests negative, he or she may still be infectious. Dental personnel must assume that all body fluids and contaminated instruments and materials are infectious and use universal precautions to protect themselves and the patients.

IMMUNIZATION AND TESTING

Dental personnel providing direct patient care, including civilian employees, volunteers, dental laboratory, and repair personnel who are directly exposed to blood and saliva, must receive an HBV vaccine. Also, all active duty healthcare personnel will receive HIV and tuberculosis testing and or screening on an annual basis during each calendar year.

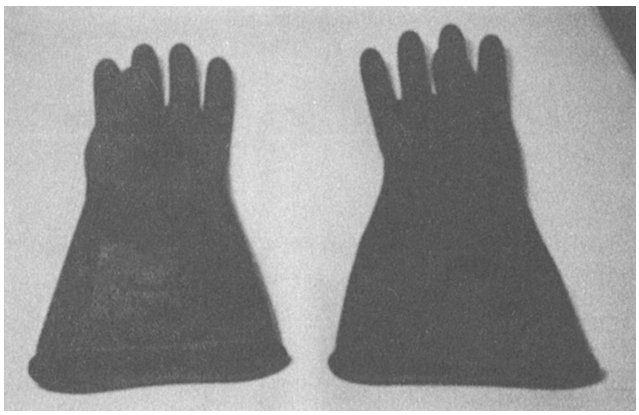

Figure 9-1.—Heavy-duty utility gloves.

MEDICAL HISTORY REVIEW

A thorough review of each patient's current medical history is mandatory before initiating any dental examination or treatment procedure.

BARRIER TECHNIQUES AND PROTECTIVE ATTIRE

An effective approach to disease prevention is to reduce exposure to potentially dangerous micro-organisms that may contaminate the body. A method called the "barrier technique" provides a physical barrier between the body and source of contamination. Barrier techniques include the use of personnel protective equipment (PPE) and surface covers. PPE provides protection from contamination to the body with the use of a mask, eyeglasses, gloves, and clothing.

Barrier covers prevent contamination of areas that are exposed to aerosols, splatter, or contaminated fingers during patient treatment. If not covered, these same areas would require adequate disinfection after treatment; otherwise, they would be sources of cross-contamination for the next patient. To protect surfaces against contamination by blood or OPIM, use the following disposable materials:

- Plastic wrap or bags
- Aluminum foil
- Impervious backed paper

These barrier covers (fig. 9-2) can also be used on areas in the dental treatment room (DTR) that are difficult to disinfect, such as light handles, dental control units, switches, headrests, bracket and instrument trays, three-way syringe bases and controls, or X-ray tube heads. Using surface covers as protective barriers has several advantages over disinfecting the surfaces.

- Preparation and clean up of the DTR is accomplished with greater efficiency.

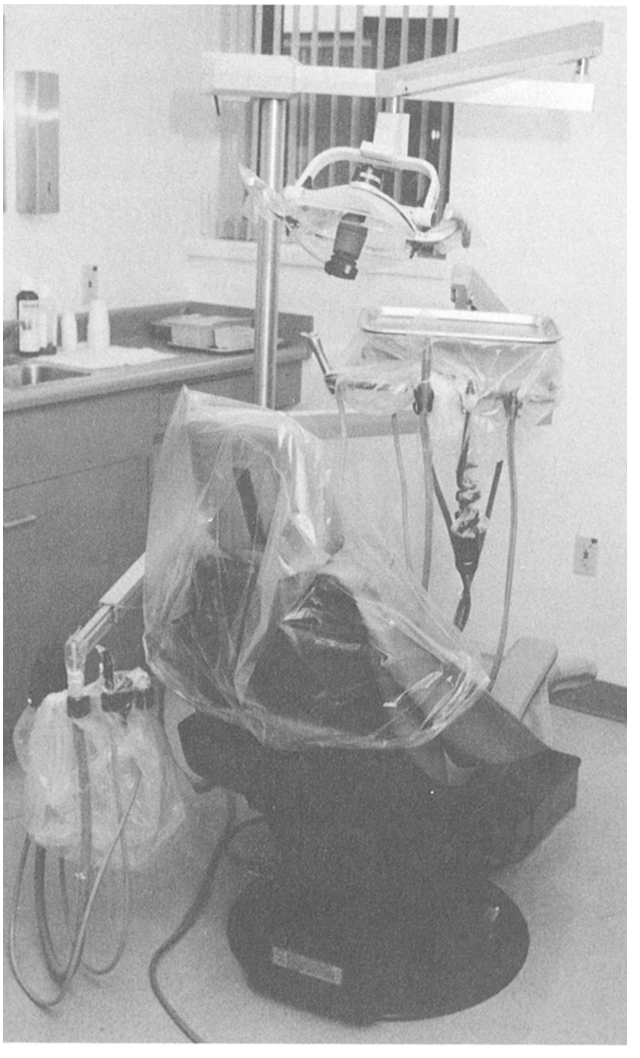

Figure 9-2.—Plastic barrier covers in a DTR.

- Headrest covers, plastic wrap or bags, aluminum foil, or impervious backed paper can be placed and removed on the surfaces easier and faster than disinfecting.
- A reduction in the amount of cleaners and disinfectants otherwise used.
- Enhanced longevity of equipment because of reduced contact with corrosive, caustic, or staining compounds in disinfectants.

The disadvantages of using barrier covers are the increased cost of disposables and additional amount of solid waste.

Gloves

Wear gloves for all patient contact activity. Complete all treatment on each patient and wash and reglove before beginning treatment procedures on another patient. Gloves torn or punctured during patient treatment should be replaced immediately.

Since washing increases the porosity of gloves up to 60 percent, repeated use of a single pair of gloves is not permitted. Also petroleum-based hand lotions should not be used before donning gloves.

Many types of gloves are available for use in the dental clinic. The four most common are as follows:

Sterile surgical gloves—They are the highest quality, most expensive, and best fitting. They are used for surgical or invasive procedures (bloody) where maximum protection against infection must be provided for the patient and the provider.

Procedural gloves—They are manufactured the same as sterile surgical gloves; however, these gloves are nonsterile and are not individually wrapped in pairs. Procedural gloves offer the highest quality and best fit at a greatly reduced cost when sterile surgical gloves are not required.

Latex examination gloves—These are the least expensive type of nonsterile gloves that are commonly used in routine dental procedures. They are available in a variety of sizes and come with or without cornstarch for ease in putting them on and off. Some individuals may develop hypersensitive reactions either to the latex material or the cornstarch. If this occurs, latex powderless gloves should be worn. If a true latex allergy exists, it should be documented in the staff member's medical record.

Clinical Apparel

Wear reusable or disposable clinical apparel, such as smocks, scrubs, laboratory coats, or other personal protective attire when treating patients or working in areas where contaminated or potentially contaminated materials may be present. When surgical procedures are performed involving reasonable exposure to blood or OPIM, additional personnel protective equipment or apparel, such as long-sleeved gowns, is required. Forearms must be covered if one reasonably assumes that they will be splattered with saliva or blood. All dental personnel must take the following precautions regarding the use of clinical apparel:

- Wear clinic apparel only in the DTF.
- Change clinic apparel daily and when visibly soiled.
- Turn in soiled linen at the end of the work period and place them in a soiled linen receptacle (fig. 9-3).
- Do not leave dirty clinic attire in personal clothing lockers or spaces overnight.

Face Mask and Shield

Wear a face mask or a full-length face shield with a face mask during any patient treatment. Wear a mask in the DTR and central sterilization room (CSR) where aerosols are a problem, especially on the dirty side of the CSR. Personnel must change face masks in the following situations:

- After each patient or when the mask is visibly soiled.
- When involved in other activities such as prosthetic laboratory and equipment repair procedures where airborne particles or dusts are produced.
- When sorting laundry.
- During decontamination procedures.
- When cleaning spills of infectious wastes.

Protective Eyewear

Wear protective eyewear when assisting or providing treatment or other procedures that may cause a splash, splatter, or airborne particles. Eyewear or goggles must have solid side shields to provide maximum protection. Patients must be provided approved protective eyewear. Disinfect patient eyewear after treatment.

Protective Headwear

Wear disposable protective headwear during surgical procedures such as periodontal, endodontic, and oral surgery. Headwear must fit the head to minimize exposure of the head and hair to potential splashing or spraying of blood or airborne particles.

Eating, Grooming, Drinking, and Smoking

Eating, grooming, drinking, and smoking are permitted only in designated areas separate from DTRs. Follow all BUMED and command instructions pertaining to this matter.

INFECTION CONTROL IN THE DTR

Infection control in the DTR is your responsibility. There are many precautions and procedures involved with infection control practices. The implementation of aseptic techniques is required when preparing for patient treatment, during

Figure 9-3.—Soiled linen receptacle.

treatment, and after the patient is dismissed. There can be no short cuts or deviation from your command's written procedures and guidelines on infection control. They must be done correctly. You must be able to accomplish the following infection control procedures:

- Prepare the DTR for treatment.
- Assist the dental officer during treatment.
- Disinfect the DTR between patients.
- Secure the DTR at the end of the day.
- Perform housekeeping duties.
- Sort laundry.
- Dispose of infectious waste.

PREPARATION OF THE DTR

In accordance with BUMEDINST 6600.10, the *Dental Infection Control Program*, the following procedures should be used. As a dental assistant, it is your responsibility to ensure that your DTR is properly prepared to treat dental patients. All dental personnel must strictly adhere to the procedures explained next.

Unit Water Supply System

At the beginning of each workday, flush each of the unit water lines and hoses for at least 1 minute, beginning with the cup filler and cuspidor even if their use is not anticipated. Potable water supplies may contain up to 100 bacterial colony forming units per millimeter (cfu/ml), and water in dental units, at times, can contain in excess of 1,000,000 cfu/ml. This microbial contamination comes from the retraction of contaminated water and saliva through the dental handpiece and the growth of bacteria in the unit water lines. Although most incoming water is chlorinated, chlorine loses its potency as the water lies stagnant in the unit tubing. Under the right circumstances, these bacteria will multiply and may become pathogenic.

Working Surfaces

Open instrument trays, packs, or cassettes and leave wrapping material **underneath** as a barrier for the work surface. To protect surfaces against contamination by blood, you should cover and use barriers for areas that are difficult to disinfect.

Infection Control During Dental Treatment

Aerosols in the work environment present a potential health hazard for both the dental staff and patient. The long term effect is cumulative and may be harmful. The use of high-volume evacuators (HVEs) and rubber dams during all dental procedures generating aerosols will reduce the volume of aerosols and decrease the level of micro-organisms. Aerosol levels can also be lowered and minimize the potential risk by employing the following procedures:

- Clean cavity preparations with water, air, or an air and water combination.
- Cover ultrasonic tanks when in use.

The dental officer may direct you to have patients brush their teeth or rinse with a mouthwash **before** treatment. This will reduce the microbial concentration of their oral flora (saliva). Three 10-second rinses will temporarily reduce a patient's microbial count by up to 97 percent. Many dentists are now using a 0.12 percent chlorhexidine gluconate preoperative rinse that also significantly decreases the amount of microbial count of an aerosol.

The following procedures should be used with all dental patients for infection control:

- Be sure to wash your hands before donning and after removal of gloves.
- Wear sterile gloves for all invasive surgical procedures.
- Use nonsterile gloves for examination and other nonsurgical dental procedures.
- Use a rubber dam whenever possible. Swab isolated teeth with an antimicrobial mouthwash to reduce aerosolization of oral bacteria.
- Use disposable suction, saliva ejector, and irrigation tips.
- Autoclave all instruments that can withstand heat sterilization.
- Sterilize rotary cutting instruments such as burs and diamonds before using.
- Use the unit dose concept when dispensing supplies for each treatment setup. This is mandatory.
- Use sterilizable cassettes, tray sets, or packs for instruments.
- Place the proper amount of supplies in each setup before sterilizing.
- Store opened packages of supplies in closed drawers or cabinets in the DTR (in a covered container if practical).
- Use clean forceps to dispense only enough supplies for immediate use.
- **Never** use your hands to dispense items from bulk storage containers.
- Use of bottled irrigation solution for surgical and nonsurgical procedures is considered sterile only for that patient if aseptic techniques are maintained.
- Record expiration dates on all opened containers.

Before leaving the DTR, all personnel will remove and discard gloves and masks worn during patient treatment, **except** when transporting contaminated items to the CSR or to the prosthetic laboratory if authorized by your Command Infection Control Officer.

To prevent transfer of secretion to and contamination of a patient's chart, remove gloves and wash hands (unless cover gloves are worn) before writing in dental records, viewing radiographs, or taking photographs.

Disinfecting the DTR Between Patients

You have just finished with a patient, and the dental officer is15 minutes behind schedule and your last patient for the morning is waiting in the reception area. You are in a hurry to set up for the patient. **Stop, slow down, and think!** Disinfecting your DTR for your next patient takes time and must be done correctly. Always wear gloves while handling nonregulated waste materials and instruments or cleaning contaminated surfaces. Place all nonregulated, nonsharp, disposable materials in designated containers lined with plastic bags. Use foot operated containers if they have lids.

The ultimate goal of an aseptic technique is to break the chain of infection and eliminate the possible transmission of infectious disease between patients

and between patients and staff. Use the following information when breaking down your DTR and setting up for your next patient.

DENTAL INSTRUMENTS.—You must never lay contaminated instruments directly on countertops or work surfaces. Rewrap cassettes, packs, or trays in the original wrap and place individually packaged instruments in a leakproof covered container to transport to the CSR.

LIQUID REGULATED WASTE.—Place all regulated liquid wastes in designated leakproof containers identified either by the color red or by a biohazard label. Pour liquid regulated wastes into the sanitary sewer system through clinical sinks (not handwashing sinks) or unit cuspidors unless local or state regulations prohibit this practice.

THREE-WAY SYRINGE TIPS.—Disposable syringe tips are preferred. Sterilizable syringe tips may also be used if disposable syringe tips are not available.

DISPOSABLE SHARPS.—Treat used disposable sharps, such as needles, scalpel blades, carpules, disposable syringes, used burs, and broken instruments as **regulated waste.** Handle these items with extreme care to prevent any unintentional injury and the possible spread of bloodborne diseases. Place used disposable sharps in puncture resistant containers specifically designed for needles and other sharp items. The universal symbol for biohazard must appear on these containers. Do not recap, bend, break, or otherwise manipulate needles by hand. In the dental setting, because a patient may require a second injection of local anesthetic, and most syringes are not disposable, recapping is sometimes necessary. Use the following guidelines when recapping:

- Never recap a needle using a two-handed technique.
- Use one of the commercially available sheath holders, or use the "scoop" technique.
- If using the scoop technique, the cap is scooped up from the tray with the needle tip using only one hand.
- Never allow uncovered needles to remain on the instrument tray.

DENTAL HANDPIECES.—Many dental clinics with CSRs will have you remove the contaminated handpieces you have used to complete a procedure and turn them into the CSRs along with your instruments. The CSR technician will handle, disinfect, lubricate, and sterilize the dental handpieces. This saves the dental assistant valuable time and avoids any excess aerosols that occur during the disinfection and lubrication procedure.

If your command requires you to perform handpiece maintenance in the DTR, you should remove handpieces after each patient, then lubricate and run them for **30 seconds.** (This will also serve to purge the tubing as stated previously.) This procedure removes any potentially infectious material from retraction of coolant water during previous treatment. Many manufacturer's require lubrication of handpieces before and after sterilization. To prevent cross-contamination, follow these procedures:

- Use two separate containers of lubricant-one marked for lubrication before sterilization and another marked for after sterilization.
- Lubricate handpieces with one end in a headrest cover to capture the aerosol contaminants or use one of the many commercial products for cleaning and lubricating handpieces.

For disinfecting **nonautoclavable** handpieces while wearing gloves, use the following procedures:

- Submerge two gauze sponges per handpiece in a high level, EPA registered disinfectant. Squeeze out any excess.
- Use one sponge to wipe the handpiece and discard.
- Wrap the second sponge around the handpiece and return it to the holder for the period of time specified by the manufacturer.
- Before reuse, wipe the handpiece thoroughly with potable water to remove residual disinfectant.

If the handpiece is autoclavable, perform the following:

- Remove the handpiece from the couplings, clean, and lubricate following the manufacturer's instructions.

Barrier Clean Up

After you complete the previously mentioned procedures, remove and discard the disposable coverings or barriers contacted during patient treatment while you are still gloved. It is important to remove the surface covers carefully to prevent contamination of the covered areas. This is accomplished by turning the soiled outer side toward the inside, or inside-out.

You must clean and disinfect the previously covered surfaces between patients **only** when the integrity of the physical barriers has been compromised or when the surface is visibly soiled. For example, if moisture is absorbed through the cover to the underlying surface, then the purpose of the barrier is defeated, and the surface must be disinfected.

Cleaning Unprotected Areas

Using the spray-wipe-spray technique, clean and disinfect all unprotected "high touch" areas with an intermediate-level, EPA-registered disinfectant. Remove all debris and particulate matter before disinfection. To be effective, the disinfectant must remain in contact with the surfaces for the time specified by the manufacturer. **Do not use** 2 percent glutaraldehyde as a surface disinfectant because of its caustic vapors and high cost.

Bringing Contaminated Items to the CSR

After completion of the above procedures, you can now take all metal and heat stable items to the CSR for sterilization. Ensure all instruments and equipment are handled properly and no sharp objects are protruding through packs or cassettes while transporting items to the CSR.

Preparing for the Next Patient

When you return to the DTR from the CSR and if your room is clean, remove your gloves and wash your hands and other exposed skin surfaces with an antimicrobial soap. When discarding a face mask after removing gloves and washing hands, handle the mask only by the elastic or cloth tie strings. Never touch the mask itself. Plan the above process carefully for efficient use of time. Replace clean disposable barriers and set up clean handpieces and instruments for the next patient.

EXPOSURE INCIDENT

Dental personnel who sustain percutaneous inoculation of serum or saliva by accidental puncture, or splashing while handling contaminated instruments, equipment, or supplies must receive immediate medical evaluation to comply with local military treatment facility (MTF) guidelines. Refer to the *Nosocomial Infection Control Manual for Ambulatory Care Facilities*, NEHC-TM89-2, and report the incident as a mishap to the command safety officer using OPNAVINST 5102.1.

SECURING THE DTR

To secure the DTR at the end of the day, follow all steps as mentioned under the "Disinfecting the DTR Between Patients" heading.

Flush the high-volume evacuator (HVE) system with at least one quart of water. Clean the system with an HVE system cleaner at least once each week. Use the system cleaner more often if indicated by problems.

Spray-wipe-spray the countertops, dental unit, chair, and dental light. Flush each unit waterline and hose for 30 seconds.

If unit has a self-contained water delivery system, follow manufacturer's instructions for flushing and air purging the lines.

HOUSEKEEPING

Although micro-organisms are normal contaminants of walls and floors, these surfaces are rarely associated with transmitting infection to staff and patients; however, all facilities must remain clean. Any infection control instruction will determine and implement a written schedule for cleaning and a method of disinfection based upon location within the facility, type of surface, type of contaminant present, and tasks or procedures performed in a given area.

The OSHA and NAVOSH requirements for housekeeping include sections on equipment, laundry, and infectious waste disposal.

Equipment

OSHA and the Navy require that all DTFs ensure a clean and sanitary workplace. Work surfaces, equipment, and other reusable items must be decontaminated with an EPA-registered disinfectant upon completion of procedures when contamination occurs through splashes, spills, or other contact with blood and OPIM. Observe and perform the following procedures:

- Clean uncarpeted floor and other horizontal surfaces regularly and when spills occur. Use mops with a detergent and an EPA-registered disinfectant or a detergent with sodium hypochlorite (1:100 dilution). Mops must not be used for more than 1 day without cleaning.

- Clean walls and blinds only if they are visibly soiled.

- Inspect, clean, and disinfect on a regular basis, all bins, pails, cans, and similar receptacles intended for reuse and having the potential for contamination with blood or OPIM. Clean and disinfect these containers immediately or as soon as possible upon visible contamination.

- Noninfectious waste refuse containers are not considered infection control hazards. Line them with plastic bags, leave them uncovered, and do not allow them to overflow. Remove hinged doors on cabinet refuse containers and hinged lids on freestanding containers since they present an increased potential for cross-contamination.

- Do not pick up broken glassware directly with your hands. Instead, use mechanical means such as a brush and dust pan, vacuum cleaner, tongs, cotton swabs, or forceps.

Laundry

Bed linens, towels, smocks, trousers, and other protective attire are considered **ordinary laundry** unless they are visibly soiled by blood or OPIM. Ordinary laundry should be sorted wearing gloves and processed following your command's laundry policy.

Contaminated laundry is any laundry soiled with blood or OPIM, including saliva and will be packed in a red biohazard container or bag, or in a leakproof plastic bag with a biohazard label, before shipment to the laundry. When sorting laundry, you should wear gloves and other appropriate personnel protective attire. Bag contaminated laundry at the location of use. **Do not sort or reuse soiled laundry in patient care areas.** If your command has on-site laundry service, follow instructions contained in BUMEDINST 6600.10, *Dental Infection Control Program.*

Regulated Waste Disposal

Infectious waste, now termed "regulated waste" in the DTR is defined as any disposable material with blood or saliva on which, if handled, would release or express blood or saliva. If there is doubt as to the infectiousness of the material in question, contact the ICO or supervisor.

HANDLING.—Regulated waste must be placed in closable, leakproof containers or bags that are labeled as a biohazard (fig. 9-4). The container may be in the DTR or in a central area in the clinic. If a centralized area is used as the regulated waste depository for the clinic, the regulated waste from each DTR must be transported to this central area. If headrest covers from the DTR are used to transport the regulated waste to the depository, they must be closable and identified with a biohazard label.

The ICO should ensure that all DTRs within a clinic and all clinics within a command handle regulated waste in a uniform manner.

RECORDKEEPING.—The ICO should implement a practical system to monitor disposal of infectious waste. This system includes date, type of waste, amount (weight, volume, or number of containers), and disposition.

Further guidance for infectious waste can be found in BUMEDINST 6600.10, *Dental Infection Control Program,* and BUMEDINST 6280.1, *Management of Infectious Waste.*

HANDWASHING

Handwashing is one of the most important procedures in preventing the transfer of micro-organisms from one person to another. The purpose of handwashing is to remove these micro-organisms from the folds and grooves of the skin by lifting and rinsing them from the skin surface. Good handwashing techniques and use of gloves are essential before anticipated exposure to patients' blood or body fluids.

The skin harbors two types of flora, **resident** and **transient.** Resident organisms have these characteristics:

- Can survive and multiply on the skin.
- Can be cultured repeatedly from the skin.
- Are usually of low virulence and are not easily removed.

Conversely, transient bacteria have these characteristics:

- Do not survive and multiply on the skin.
- Are not firmly attached to the skin.
- Are effectively removed by rubbing of the hands together and rinsing them under running water.

HANDWASHING AGENTS

There are many commercial handwashing products available for use in clinics. Because of the variety, we will discuss the two main handwashing

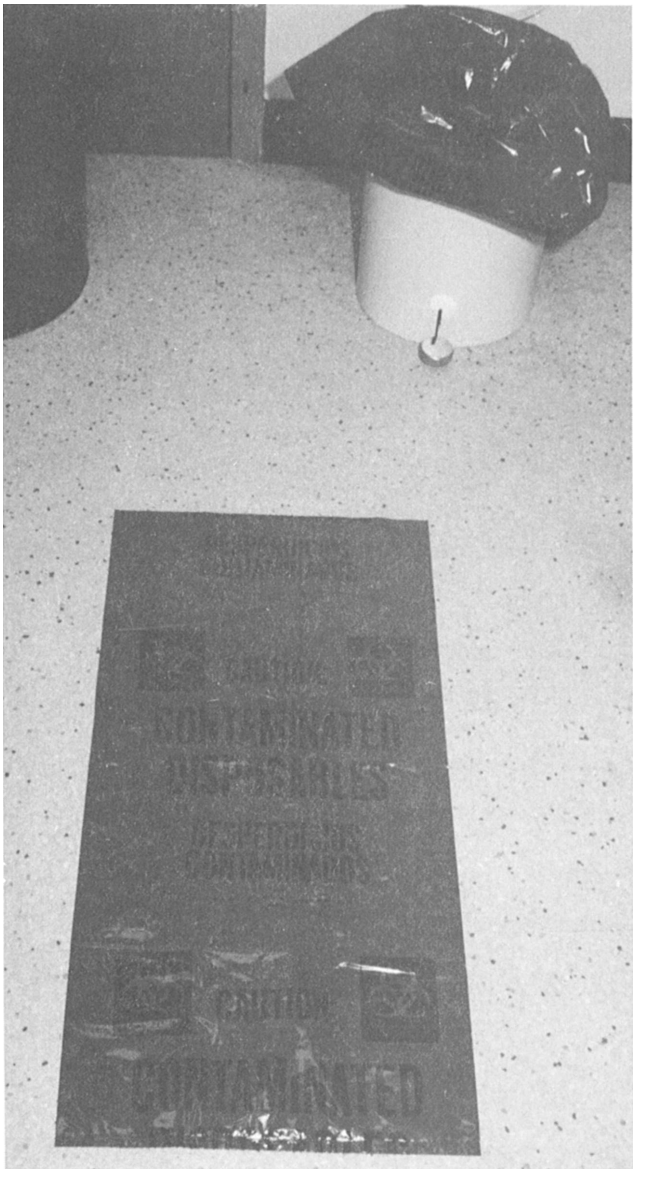

Figure 9-4.—Contaminated disposable bag with biohazard label.

agents used in the Navy, **water-based** cleaning agents and waterless handwashing agents.

Water-Based Cleaning Agents

Water-based cleaning agents include chlorhexidine, iodophors, and alcohol among the active antimicrobial ingredients approved for handwashing. Products which use aqueous quaternary ammonium compounds, such as those containing dilute benzalkonium chloride, are not approved. Outbreaks of nosocomial infection associated with the use of aqueous quaternary ammonium compounds have been documented. Two of the most common water-based cleaning agents are iodophors and chlorhexidine gluconate.

IODOPHORS.—These are water soluble complexes of iodine with organic compounds that are effective against all gram-positive and gram-negative bacteria and viruses. Iodophors usually do not have a long-acting germicidal action and, if used frequently, may cause severe drying of the skin.

CHLORHEXIDINE GLUCONATE.—This antiseptic is usually marketed as 4 percent chlorhexidine gluconate with 4 percent isopropyl alcohol in a sudsy base. Chlorhexidine gluconate is an effective antiseptic for reducing transient and resident microbial hand flora, and has a sustained antimicrobial effect. It does not appear to affect the skin adversely. Also, it is approved as a surgical scrub.

Waterless Handwashing Agents

Waterless handwashing agents contain 70 percent isopropyl alcohol and virtually disinfect the skin in 20 seconds. They are effective against tubercle bacilli, fungi, and viruses. Unfortunately, they are volatile, flammable, evaporate quickly, and dry the skin. Alcohol-based, waterless handwashing agents may be used in areas where handwashing sinks are not readily available.

HANDWASHING EQUIPMENT AND SOAP DISPENSERS

All patient care areas should have sinks with electronic or mechanical elbow, foot, or knee action faucet control for asepsis and ease of function.

The use of no hand (no touch) actuated soap dispenser controls is preferable. Maintenance for refillable handwashing agent dispensers is to empty, disassemble, and clean them weekly. Do not use bar soaps in bathrooms or clinical and common areas.

HANDWASHING GUIDELINES

All personnel involved in patient care must wash their hands, wrists, and forearms with a disinfectant soap and water at the following times:

- At the beginning of each day.
- Between patients, before and after going to lunch, after taking a break, after using the bathroom, or any time they become contaminated.
- Before gloving, after degloving, and before regloving.
- At the end of the day.

HANDWASHING TECHNIQUES

Dental staff personnel involved in patient care must follow a rigid handwashing protocol including the following practices:

- Removing all jewelry and other ornaments from the hands and wrists
- Trimming the fingernails and cuticles. Nails should be no longer than the finger tips to avoid puncturing gloves. Do not use false fingernails since contamination may occur from fungal growth between the false and natural nails. Also, do not wear nail polish since micro-organisms can hide in small cracks in the finish.
- Wetting the hands under warm, running water and applying the necessary amount, if antimicrobial soap is required, to work up a lather. Vigorously rub the hands together, fingers entwined. This creates friction and loosens dirt and micro-organisms. Clean under the fingernails using a nail brush. Continue scrubbing the wrists and lower forearms. Visibly soiled hands may require more time.

Surgical teams must scrub their hands up to the elbows with an antimicrobial surgical product for the time specified by the manufacturer. After scrubbing, dry with a sterile towel.

When washing times are too short or technique is poor, these problems may occur:

- Fingertips, thumbs, and the areas between the fingers are washed poorly or may be skipped entirely.
- The dominant hand is generally washed less thoroughly than the nondominant hand.
- Microbe counts under the fingernails have been found to remain high even after surgical scrubs.

Rinse soap off by placing hands under warm running water. If the sides of the sink are touched, you must repeat the handwashing. Dry hands with paper towels. If the sink does not have an electronic elbow, foot, or knee action faucet control, use a dry paper towel when turning off the faucet.